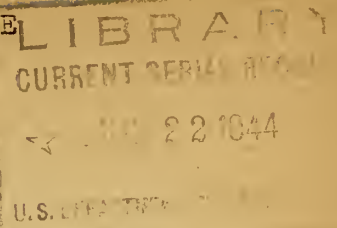


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UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**

APRIL 1944

EROSION CONTROL PRACTICES DIVISION

Conservation Experiment Stations Section

Russell Woodburn of State College, Mississippi reports: "The mulch plots gave some highly interesting data for the April rains. Three plots which had vetch turned under by spading lost in total 320 pounds of soil. Three others which had the vetch hoed in to simulate discing lost only 9.5 pounds in total. The difference in soil loss was far out of proportion to the runoff which was 179 C.F. and 89 C.F. respectively."

Oren R. Neal of New Brunswick, New Jersey reports: "The root studies that were started in the spring of 1943 were made again this month. It is the purpose of these studies to determine the quantity of roots produced under different treatments and cover crops and to measure the influence of such roots on the resistance of soil to erosion."

B. H. Hendrickson of Watkinsville, Georgia reports: "Visitors for April were 23 of record, and in addition 215 people who attended a fish fry on April 25 honoring Mr. Louis Bromfield, in the interest of Friends of the Land. Dr. H. H. Bennett gave a talk. The supper was given in the picnic area overlooking Ponds No. 1 and 2 on the Station properties. Expenses were met by several public-spirited men of Athens and Clarke County, who are interested in conservation. Attendance was by invitation only."

J. W. Slosser of Presque Isle, Maine reports: "Considerable progress has been made in the construction of a self-grading potato seed cutter. The cutter operates on the principle of a rotary drum grader connected to concave picking cups which in turn operate against stationery knives."

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** All Research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Dwight D. Smith of Columbia, Missouri reports: "Additional study of the contour corn study data for last year revealed that although for the Shelby and Mexico soils the corn yields decreased with increased degree of land slope, contouring tended to eliminate the effect of degree of slope on yield. The yield increased more rapidly with increasing depth of top soil when contoured than when planted up and down hill. The relationships were as follows:

$$\text{Contour:} \quad X_{1c} = 24.0 + 7.4X_2 - 0.6X_3$$

$$\text{Up and down:} \quad X_{1u} = 30.8 + 6.6X_2 - 2.6X_3$$

X_1 = Yield in bushels per acre
 X_2 = Surface soil depth in inches
 X_3 = Land slope per cent.

"For the Summit soil fields the corn yield increased with increased land slope for both row directions. The slope range was from 3 to 6 per cent. Also the yield increased more rapidly with increased depth of top soil for the contour planting than when the corn was planted up and down hill. The relationships were as follows:

$$\text{Contour:} \quad X_{1c} = -7.5 + 6.3X_2 + 6.0X_3$$

$$\text{Up and down:} \quad X_{1u} = -1.2 + 5.0X_2 + 5.2X_3$$

"Statistically, the relationships are all highly significant. That the yield increased with increased slope on the Summit soil may at first seem odd. While this may be due to the individual field fertility level, it could also be attributed to the characteristics of the soil series. The flatter fields were more nearly at the transition between Summit and other closely associated, yet less fertile soils."

Richard M. Smith of Morgantown, West Virginia reports: "The major effort during April was aimed at establishment of the various pasture revegetation, eroded soil, and strip mine spoil bank field trials and experiments. Frequent rains and unusually cold weather caused considerable inconvenience and delay but most of the planned trials and experiments were put in and at least a part of the remainder will be finished early in May. One of the greatest difficulties is convincing farmers that it is not too wet to work the ground. Old broomsedge or weedy pastures and barren soil have been found suitable for shallow tillage much sooner than the farmers believe. It seems evident that this belief among farmers will have to be corrected if successful seedings are to be made in many cases, because the ground is much easier to work early than later, and early seedings have much more chance of success.

"Strip mine spoil banks which are being smoothed in steeply-rolling areas such as Harrison county are creating a serious erosion and silting hazard which deserves more consideration. When the spoil material is smoothed and pushed up against the original soil slope with no basins or diversions to prevent the concentration of runoff water from above, it appears very unlikely that erosion can be checked with vegetation alone. Mechanical

means are needed, or it would seem wiser to leave the material rough or at least to leave catchment basins at the upper side of the spoil and below the original upland slope. Extreme compaction caused by the leveling machinery is another serious factor associated with leveling which contributes to heavy runoff and erosion. This is especially true when the material is leveled while it is wet and muddy.

"Fall seedings of two leveled spoil banks in Harrison county indicate that certain grasses and legumes can be established by fertilization, but the stands indicated cannot be expected to control concentrated runoff or to give high immediate yields. Soybeans grown on adjacent material were a limited success the past season. They were moderately fertilized. They offer poor protection against erosion.

"After making various field observations and soils tests and noting the results of the two experimental seedings, we feel justified in questioning the wisdom of the leveling of all strip mine spoil banks. In the case of the Bakerstown coal in Preston county, the overburden is much more favorable than that over most of the Pittsburg coal so that leveling and reclamation offer more promise, provided erosion and stream silting hazards are avoided. But for most of the Pittsburg coal overburden it is suggested that the wisest course might be to leave the spoil material rough and to provide for planting it to adapted evergreens, wildlife food, and ornamentals after the war when labor supplies are plentiful.

"Old spoil banks observed which have been handled in this way have not contributed to excessive runoff, erosion or stream silting and they are not a serious liability like some of the recently smoothed areas. And in addition they have not required an expenditure by someone of \$100 or more per acre for leveling."

E. C. Richardson of Auburn, Alabama reports: "During the winter of 1943 and 1944 kudzu was planted by the furrow method and the ordinary method of hand planting. Plantings were made on December 1, 1943 and on January 12, 1944.

"The land was prepared by flat breaking. Preparation of the land was made sufficiently early for the land to become settled prior to planting. The plants were placed in the furrow against the sloping side of the furrow. By the hand method the soil was pulled to the plants by hand. In the furrows method sufficient soil was placed on the plants to hold them in place and the remainder of the furrow filled with a 6-inch turn-plow. Results are shown in the following table:

Date and Method of Planting Kudzu

Date	Method used	Number planted	Number surviving*	Percent surviving	Method used	Number planted	Number surviving*	Percent surviving
12-1-43	Furrow	187	132	71	Hand	160	127	79
1-12-44	Furrow	133	103	77	Hand	153	115	75

"* Survival count made May 1, 1944."

Orville E. Hays of LaCrosse, Wisconsin reports: "In 1939 severely eroded (with less than 3" of surface soil) and moderately eroded (with 5-6" of surface soil) plots were fertilized and planted to a five-year rotation including three years of hay. Organic matter and nitrogen determinations were made on samples taken in 1939 and 1943. The data are contained in the following table:

The Effect of Degree of Erosion on Organic Matter and Nitrogen Content of Soil - Control plots, LaCrosse, Wisconsin
Sample depth 0-6"

Plot and degree of erosion	Treatment	Per cent organic matter		Per cent nitrogen	
		1939	1943	1939	1943
4 Moderate	Grain annually 1932-1938.....	1.56		.101	
	Crop sequence 1939 - Corn, grain, 3 years hay.....		1.80		.104
9 Severe	Fallow plus an annual application of 5 T. per acre barnyard manure 1932-1938.....	.59		.046	
	Crop sequence 1939 - Corn, grain, 3 years hay.....		1.10		.072
5 Moderate	Corn, grain, 1 year hay rotation 1932-38.....	1.17		.097	
	Crop sequence 1939 - Grain, 3 years hay, corn.....		1.85		.109
8 Severe	Fallow - 1932-1938.....	.44		.045	
	Crop sequence 1939 - Grain, 3 years hay, corn.....		1.15		.072
Average - Moderate		1.36	1.82	.099	.106
Severe		.52	1.12	.046	.072

"After three years of alfalfa timothy hay the organic matter content of the severely eroded soil was 0.70 per cent lower than on the moderately eroded soil and the total nitrogen content 0.034 per cent lower. However, the increase in organic matter and nitrogen content was greater in the eroded soil.

"Yields of corn - bushels per acre

Degree of erosion	1939	1943	Difference
Moderate.....	49.8	77.5	27.7
Severe.....	38.2	60.2	22.0
Difference.....	11.6	17.3	

"The above yields are for plots 4 and 9 in 1939 and for plots 5 and 8 in 1943.

"The organic matter content increased 0.60 per cent in the severely eroded soil and 0.46 per cent in the moderately eroded soil. The total nitrogen content increased 0.026 per cent in the severely eroded soil and 0.007 per cent in the moderately eroded soil. In 1939 the difference in organic matter content was 0.84 per cent, in 1943, 0.70 in favor of the moderately eroded plots. In 1939 the nitrogen content was 0.053 per cent, in 1943, 0.034 per cent in favor of the moderately eroded plots. That is, the spread in organic matter and nitrogen between a severely and a moderately eroded soil decreased in a five-year rotation following three years of alfalfa, timothy hay and following corn on which 8 tons per acre of manure was applied. Additional years of data will be needed in order to determine if the rotations and treatment followed would further decrease the spread."

R. E. Dickson of Spur, Texas reports: "After the successful eradication of large mesquite trees has been completed, it has been found that under favorable conditions the germination and survival of seedlings will in a few years again present an eradication problem. In the spring and summer of 1941, a year with 42.87 inches of rainfall, forty-six per cent of the seedlings which emerged under favorable rainfall conditions have survived. Burning the grassland infested with these seedlings during the month of February in 1942 and again in 1943 reduced the survival of seedlings to 23.95 per cent of the original stand but was not effective on plants over three years old. Spraying with a two per cent solution of sodium arsenite destroyed all seedlings."

F. L. Duley of Lincoln, Nebraska reports: "April was a month of unusual weather for Nebraska. The rainfall for the month was the highest on record in the 67 years that a weather observer has been at Lincoln. It was also the cloudiest, with only four clear days, and the fourth coldest April recorded. The total rainfall at Lincoln was 9.10 inches, whereas the next wettest April was in 1897 with 6.15 inches. The heaviest single rain in Lincoln was 2.79 inches. This rain, however, gave only .80 inch at our erosion plots at the Agronomy Farm. Most of the other rains have been of low intensity and have not given high runoff or erosion. On the bindweed experimental farm southwest of Lincoln there was serious erosion on clean tilled land, but very little where the residues had been left on the surface over winter. On some of our plots where good cover was present on wheat land, there has been only a trace of runoff. On land having old sweet clover residues, the land has absorbed the entire amount of rainfall."

"The work on the effect of soil treatments with organic materials on stability of structure has been continued. Some of the Nebraska Extension men have been using demonstration material developed in this laboratory to emphasize the properties of organic material coatings in slowing down the disintegration of lumps of soil."

Bruno Klinger of Fort Collins, Colorado reports: "In company with representatives of the Colorado Experiment Station, the Project Supervisor examined stubble fields in east, central and northeastern Colorado, and selected six of them for stubble mulch field tests to be made this year. Several fields that had been subsurface tilled last year were also examined. The surface layer was much less compact than the

corresponding layer on the area fallowed in the usual way. The stand of wheat on the subtilled area of a field near Burlington was much more uneven and less vigorous than that on a comparison strip. Seeding on the sub-tilled plot had been done five days later last fall than on the other one, and during this interval the surface soil had dried considerably."

C. J. Whitfield of Amarillo, Texas reports: "Grazing tests for 1944 were begun on April 1. The cattle project is essentially a comparison of five pastures, three of which are native and two seeded. The early spring grazing on these pastures brings out the advantage of early green spring forage for securing early gains. Seeded western wheat pastures would be valuable on many farms where too much of the land has been plowed out, by giving the farmer a producing pasture after it is necessary to remove cattle from winter wheat. Usually farms do not have enough native pasture to prevent injury in spring, which is a real cause for the deterioration of small pastures and increased erosion and water loss.

"The pastures, forage, condition and average gains per day are given in the following table:

Pasture	Type of vegetation	Condition	Average daily gain (Pounds)
I-1*	Blue grama, buffalo, little barley	Good	1.60
H-1	Blue grama, western wheat, little barley, false ragweed, smartweed, barnyard grass	Fair	1.75
I-2	Western wheat, Canada wild-rye, little barley, blue grama, etc.	Good	1.98
F	Western wheat, Canada wild-rye	Excellent	1.80

* All pastures were 44 acres; 10 yearling steers were placed in each pasture except F which had 29. All groups were assigned by random selection. As noted, unusually good gains were made during April.

"The following table compares April 1944 gains with the previous winter gains and gains made on comparable pastures during the first grazing period of 1943 (April 14 to May 11, 1943):

Group	Pasture	Gain per head					Per head consumption of salt, Apr. 1944
		Nov. 11, '43 to Apr. 1, '44	Apr. 1, '44 to Apr. 30, '44	Ratio - Apr. to winter	Daily for Apr. 1944	Daily for Apr. 14 to May 11, '43	
I	F	108.6	51.4	1:2.11	1.71	1.9	1.24 lb.
II	F	102.6	52.9	1:1.94	1.76		1.24 lb.
	(H-2 Group)						
III	I-1	95.6	47.9	1:2.00	1.60	2:1	2.00 lb.
IV	I-2	102.7	59.3	1:1.73	1.98		0.6 lb.
V	H-1	100.0	52.5	1:1.90	1.75	2.6	1.4 lb.
Extras	F	70.6	52.5	1:1.34	1.94		1.24 lb.

"It is evident that calves which have taken winter feed less eagerly will make more rapid gains at first when given access to good grazing. Groups I, II and the extras rank in this order with respect to winter gain. The ratio of April to winter gains of these groups is in reverse order even though all groups were grazed on the same pasture. This does not infer that it is profitable to feed scanty winter rations but does indicate that animals making low winter gains make an exaggerated response at the first of the grazing period."

Joel E. Fletcher of Tucson, Arizona reports: "In a preliminary survey of the extent of the poor physical structure of soils known as 'puddling' a marked area of compaction was found just below the depth to which the soil had been worked during culture... The extreme degree of this compaction is illustrated by the volume weights found in one field.

<u>Depth</u>	<u>Volume weight</u>
0" - 3"	1.407
4" - 8"	1.808
13" - 20"	1.300

"The high degree of compaction in itself would not be so alarming but observation indicates that the layer markedly inhibits root development and growth as well as to greatly reduce the infiltration rate of the soil."

T. L. Copley of Raleigh, North Carolina reports: "Crop samples were taken from the plots seeded to winter cover crops of rye and rye grass with and without application of sodium nitrate at time of seeding. Applications of sodium nitrate at the rate of 150 pounds per acre increased the yield of both rye and rye grass as shown in the table below:

<u>Winter cover crop</u>	<u>Yield of tops and roots Tons/acre</u>
Rye.....	1.63
Rye - 150 lbs. of nitrate of soda per acre applied at time of seeding.....	2.67
Rye grass.....	1.77
Rye grass - 150 lbs. of nitrate of soda per acre applied at time of seeding...	2.91

"An interesting observation has been made this spring in connection with the mulch plots which were started last fall. The plots were laid out on a stand of lespedeza and Red top with considerable weeds and crabgrass also present. Wheat was seeded last fall as outlined. On the plots turned for wheat, a good stand was secured and a normal crop seems to be in prospect. Subsurface preparation, however, did not destroy the perennial grass and this naturally interfered both with securing a stand and with subsequent growth. Fertilizer applied to the wheat stimulated the grass instead, which is seriously competing with the wheat. These preliminary observations indicate that a subsurface sweep may not be satisfactory in soil preparation for wheat if a perennial grass is

John T. Bregger of Clemson, South Carolina reports: "In the cover crop evaluation study yield counts were made to determine fertility and residue values. At the prebloom stage of growth when cultivation would in most cases check further growth, the following yields were obtained:

Species	Green weight Tons/acre	Dry weight Tons/acre
So. spotted bur clover.....	16	2.4
Crimson clover.....	8	1.2
Vicia grandiflora.....	6.25	.7
Button clover.....	4	1.25
Hairy vetch*.....	2.75	.575

*In somewhat diseased condition.

"Most of the above cover crops are being measured at a more mature stage (post blooming date) which will give a better idea of their value as mulch producers.

"By the last of April when the first rainless period of several days occurred, soil moisture determinations showed crimson clover to be lowering the soil moisture level at a faster rate than the early strain of So. spotted bur clover. This indicates a difference in moisture utilization in coordination with the rate of maturity of the cover crop which is being closely watched. Since peach trees need a maximum supply of soil moisture and nitrates at this time of year, cover crop competition can be a factor worthy of serious consideration. The only alternative to an early maturing cover crop to avoid this competition is a tillage operation which will destroy or subdue the cover crop before it can provide maximum returns in fertility conservation values."

John Lamb, Jr. of Ithaca, New York reports: "Arnot: soil loss and organic matter.-Mr. E. A. Carleton recently completed organic matter analysis of soil samples collected at the Arnot in the late fall of 1943:

Management	Soil loss Tons/acre	Organic matter Per cent
Buckwheat continuous; 5 years.....	20	3.6
Corn continuous; 200 lbs. 5-10-5 annually; 9 years.....	34	3.1
Fallow; 9 years.....	84	3.1
Meadow; lime, 0-20-0; 9 years.....	Trace	4.2
Idle land - weeds, grass, etc.; 9 years.	2	4.2
Rotation corn-oats-clover; 9 years.....	4	3.5
Rotation corn-oats-clover, plus manure; 9 years.....	2	4.0
Rotation corn-oats-clover; plus manure, lime, 0-20-0; 9 years.....	2	4.6

"The soil samples represent a depth of 6 inches. Approximately 29 per cent of the plow layer will pass through a one-millimeter sieve; the balance is gravel and stones. Ninety-five per cent of the eroded soil will pass through the same sieve. All of the crops were removed except, of course, the weeds and grass of the idle-land plot. Manure was applied at the rate of six tons per acre before corn. Limestone and superphosphate were applied in sufficient amounts to grow clover. The corn with all of the crop removed seems to have lowered the organic matter content as much as the fallow treatment. The manure used was well-rotted, and high in resistant organic matter.

"The continuous meadow and idle-land plots have not been disturbed for nine years. The organic matter content was determined by layers.

Depth	Organic matter content	
	Meadow	Idle land
Inches	Per cent	Per cent
0 - 1/2.....	7.77	7.46
1/2 - 2.....	4.17	4.19
2 - 4.....	3.76	3.85
4 - 6.....	3.88	3.85

"The tendency for nature to accumulate organic matter at the surface is quite apparent here."

Alvin E. Lowe of Garden City, Kansas reports: "During fourteen days of the month precipitation amounted to .01 or more, whereas, the long time average is only 7. The total amount of precipitation was 6.19 inches, the most for any April at this Station in 36 years of records. The average for April is only 1.78 inches. The total for the calendar year 1944 to the end of April was 9.95 inches. The average is only 3.51. In 1934, 1935 and 1937 the total precipitation for the year was less than we have already had in 1944.

"All the Basin Project plots scheduled for sorghum or fallow were worked the first week of April and so were in ideal condition to take in this large amount of precipitation. The freshly basined plots did not lose any water regardless of type of basin as the rains came slowly. The one-wayed wheat plot appeared to have lost a little. The plots now in wheat lost a little by runoff during one or two rather hard rains the last of the month when the ground was saturated."

Hillculture Section

C. S. Britt of Beltsville, Maryland reports: "C. S. Britt attended a staff meeting of Southern Maryland Operations Technicians working under the leadership of Mr. M. B. Fussell, District Conservationist. At this meeting and in subsequent field trips plans have been made for Field Trials on 10 farms. Five trials deal with the conversion of broomsedge fields by disking, liming, fertilizing and planting either Lespedeza sericea or sweet clover. Five farms are going to use grade ridged rows in their tobacco fields."

Henry Hopp of the Hillculture Section, Washington, D. C., has recently completed a survey of the brush problem in Atascosa County, Texas. "This survey shows that a large part of the agricultural land of Atascosa County is infested with brush. The mixed mesquite type, which consists of mesquite and lesser proportions of other species, constitutes the major brush problem, accounting for more than two-thirds of the brush area in the County and being the most prevalent type on all classes of land, except Class V land, where bottomland brush predominates. Most of the brush in the County is of medium density and the greater proportion is on Class III land, which would normally be highly suitable for grazing. Almost one-fifth is on Class II land, which would be desirable for cultivation if satisfactorily located. A smaller but definite proportion is on Class VII land. The economic desirability of clearing land in the latter category is probably questionable, considering its low productivity and the limitations in use intensity."

Conservation Economics Section

H. O. Anderson of LaCrosse, Wisconsin reports: "Work has been started in analyzing the conservation planning problem on small, sandy, and poorly drained farms in Central Wisconsin. Data obtained from six farms in this area in 1943 indicate only a little more than one-half as much production and income per farm as on farms of similar size in the Coon Creek and Fennimore Areas. In 1944, information will be obtained from 36 farmers in Waushara and Adams Counties in addition to data on 20 other farms to be obtained by Soil Conservation District personnel. Production and expense records will help to evaluate the income possibilities for farms of various land use capability levels in this area."

H. L. Thomas of Corvallis, Oregon reports: "Economic considerations in farm conservation planning in the Chehalem Mountain Area in Northwestern Oregon are described in Oregon Agricultural Experiment Station Circular 156, recently released. It points out that a carefully planned soil conservation program for farms in this area fits readily into the farming system, involves relatively small cash cost, contributes considerably to the annual farm income and stabilizes the investment value of the land. The effects of conservation plans on production, farm income and expenses are evaluated for four specific farms of different types as follows: (1) an 80-acre dairy and fruit farm, (2) a 145-acre diversified

farm, (3) a 40-acre berry farm, and (4) a 27-acre walnut farm. The soil conservation program stresses in varying degrees of adaptation to individual farms the following practices:

1. More effective use of winter (legume and grain) cover crops on orchard land. This means proper utilization of the crop for mulching and improving the organic matter content of the soil (the addition of straw is also helpful).
2. The use of terraces, and other supplemental drainage structures to prevent erosion, and to provide an orderly means of draining surplus water during heavy rainfall periods.
3. The use of a well-balanced crop rotation, including legume and grass crops.
4. The shift of certain cultivated lands from grains to grass and hay crops.
5. The use of commercial fertilizer and lime where necessary to secure good stands of grass and legume crops.
6. The use of contour cultivation on sloping land."

WATER CONSERVATION AND DRAINAGE DIVISION

Hydrologic - Land Use Studies

North Appalachian Experimental Watershed at Coshocton, Ohio -

Precipitation for the month totaled 0.16" above normal.

Station 109 has been completely overhauled, and considerable sediment has been removed from the approach channel to Station 91. Magnetic pen synchronizers were installed on eight runoff stations and at five recording rain gages.

The two-foot diameter inclined-axis silt sampling wheel was completed and temporarily installed with a one-foot H flume for testing. It apparently operated satisfactorily for all flows from a dribble up to the capacity of the flume (about 1 cfs). No exact tests could be made with this installation but rough tests showed that the sample caught was between 1.1 percent and 1.9 percent for ranges tested. Leaves, grass and other trash put into the stream were all shed off the wheel within three or four revolutions. It was decided to install this wheel at Watershed 188, where there is a three-foot H flume and silt box. As this watershed will be in corn in 1944, there will probably be a number of runoff periods which should permit several comparisons with the present method of silt measurement. Minor alterations as to supporting frame and length of axle necessary for use with a three-foot flume are being made and construction of two additional samplers is under way. It is planned to install these two samplers on Watersheds 106 and 121 which will be in corn in 1944 and at which there are no silt boxes.

The plot layout for the mulch studies in corn for 1944 was completed and samples of soil, litter and plant residues taken. Manure was applied on six of the plots and preparations made for tillage operations.

Assistance was given the Soil Conservation Service District office in seeding alfalfa-grass and alfalfa-clover-grass mixtures by the disking method in accordance with procedures developed in the State of Ohio for field trials of this nature. The lime requirement has been determined on a number of soil samples collected on some of the District farms in the county. The analysis of the lysimeter percolates has been continued. Laboratory work has also been done on freezing point determinations of the soils.

A report of the results obtained from the mulch plot studies during 1943 has just been completed and is being assembled. This report includes data in both tabular and graphical form and also photographs of the various tillage and mulch culture practices used. The statistical analysis of the data is also included.

The manuscript entitled "A Summary of Soil Moisture and Other Hydrologic Data Useful in Soil and Water Investigations" was revised on April 6, and sent to the Washington office where it was approved for presentation on the program of the AGU and subsequent publication in the Transactions.

Central Great Plains Experimental Watershed at Hastings, Nebr. - Rain and snow began falling on the 9th and some precipitation was measured every day for the rest of the month except on the 13th, 19th and 25th.

The wind blew quite hard several days during the month. The highest average for an hour was 41 miles on the 24th. There was a total of six days of sunshine during the month.

Plots were prepared for oats and barley the first week in April and seeding of barley was started on the 8th but due to the wet weather the plots could not be finished during the month.

Hydrologic Studies - LaFayette, Indiana - Total rainfall in the vicinity of LaFayette for April was 6.25", 2.72" above normal.

As has been noted previous springs, the old meadow watersheds which had produced little or no runoff in previous months, became extremely wet and produced more runoff during the wet period than those in wheat or in lighter grass cover. The same has been true of the wooded watersheds.

A special report, "Soil and Moisture Conservation Research in Indiana, Results Bearing on Increased Production for War Needs," was released as a mimeographed publication by the Experiment Station (Agr. Engr. Mimeo. No. 1).

Work continued on installation of automatic runoff samplers on watersheds to be in corn this season. Some of the samples collected were obtained from these installations, others were collected manually.

Arnot Soil Conservation Experiment Station, Ithaca, N. Y. - B-2 - Warm weather prevailed during the period, but with no storms of high intensity that ordinarily cause sharp peak runoffs. The ground remained wet, however, with resulting seepage flow. Winter banking of straw and cornstalks were removed from intake and discharge of all flumes, and all instruments set for summer operation.

Hydrologic Studies - Cherokee, Oklahoma - The rainfall for Cherokee was 3.92" above the long-time Weather Bureau average for April. A total of 3.9" occurred April 21 and 22. The percentage of runoff from this rain, according to tillage treatments on terraced and unterraced land, was as follows:

Method of Tillage ^{1/}	UTWS ^{2/}	UTC ^{3/}	TC ^{4/}	Total
Stubble mulch	49.67	48.17	38.80	45.54
Plowed	53.66	53.64	35.26	47.52
Listed	54.98	49.61	47.79	50.79
Basin listed	49.50	47.94	46.02	47.82
Total	51.95	49.84	41.97	47.92

- 1/ The wheat was 3 to 4" high. All lister furrows were destroyed when the wheat was seeded last fall.
 2/ Terraced cultivated with slope.
 3/ Terraced contour cultivated.
 4/ Terraced one end open, contour cultivated.

All the plots and watersheds were covered with a good stand of wheat which was 3 to 4" high. The results of the runoff from the listed and basin listed areas are not significant because all the ridges and furrows were destroyed in the preparation of the seedbed for wheat last fall. The stubble mulch plots lost the least amount of water from this particular rain. However, the percentage of runoff from the watersheds are:

Basin listed	52.81
Stubble mulch	52.64
One-way plowed	45.91

The most outstanding fact was that the runoff was 19.2 percent less from the terraced and contour cultivated plots than that from areas unterraced and cultivated with the slope. Another interesting fact about this rain was the amount of runoff from the different sizes of watersheds, which is as follows:

Size Group of Watershed (acres)	Maximum cfs/A	Average Runoff (Inches)	Average Runoff (percent)
2	2.61	2.06	53.40
4	2.10	1.93	48.98
8	2.05	1.92	48.83

The crops and grasses are making very nice growth. The water channels that had a good stand of alfalfa withstood the heavy runoff in excellent shape.

Microbiological Studies - Lincoln, Nebraska - The spring samplings for nitrates have been greatly delayed by the continued rains. Nitrogenous fertilizers have been applied to wheat on plowed land and also on land with different amounts of residue.

The work on the effect of soil treatments with organic materials on stability of structure has been continued. Some of the Nebraska Extension men have been using demonstration material developed in this laboratory to emphasize the properties of organic material coatings in slowing down the disintegration of lumps of soil.

Runoff Studies

Region III - Edwardsville, Ill. - Precipitation for the month was 9.21". Of this amount, 5.4" fell during a 24-hour period on April 22 and 23. The maximum amounts for various time intervals during the April 22 storm were: 5 minutes - .35"; 10 minutes - .47"; 15 minutes - .64"; 20 minutes - .80". Comparison with Miscellaneous Publication 204 indicates these values are of about one-year frequency yet they occurred at a time when the watershed was quite bare and resulted in heavy runoff. The total runoff for the month was in excess of 5" and the infiltration rates near the end of the rainfall of April 22 and 23 appear to be about .02"/hr., which agrees with a number of previous observations. Peak rates of runoff during this storm were: 1.05" per hour on the 27-acre alfalfa watershed; .97" per hour on the 50-acre pasture watershed; and .71" per hour on the 290-acre mixed cover watershed.

Region VI - Albuquerque and Santa Fe, N. M., and Safford, Ariz. - In connection with probable water losses from an irrigation canal near Tularosa, New Mexico, the Office of Operations deemed it advisable to secure discharge measurements at certain points along the ditch and determine the amount of seepage. Subsequently, an inquiry was made of Mr. Dorroh as to whether the Office of Research would loan two water stage recorders for the duration of the investigation. With the assistance of Mr. Rouse, Project Supervisor at Colorado Springs, two Friez Recorders were made available and were installed on April 23. They are being used with Parshall flumes.

During this month certain other assistance was given Operations in connection with estimates of probable maximum discharges from three watersheds in New Mexico. Also Mr. Tracy L. Hagg, Zone Technician, requested and was furnished an estimate of probable precipitation and length of growing season in a section of the state where available Weather Bureau data are very meager.

The ten watersheds under Mr. Dorroh's supervision were in continuous operation during April. No changes were made in the instrumentation being employed, with the exception of recording rain gages near Santa Fe. The time scale of three gages, Nos. R1, R3, and R5, was changed from weekly to a 12-hour basis and the antifreeze "charge" was removed from

all recorders in that vicinity. During the month all watersheds were visited four times each.

Precipitation during April was deficient at all watersheds with the exception of W-II Safford and W-III Santa Fe. Accumulated totals for 1944 also followed the same pattern. This condition was reflected in below-normal snow accumulation on the mountains of southwestern New Mexico and eastern Arizona where the storage was so inadequate that Parshall* has predicted an almost complete depletion of the San Carlos Reservoir, due to the normal draw-down for irrigation water and a lack of snow runoff. The situation in northern New Mexico and southern Colorado was, however, entirely different as accumulated snow storage averaged normal to above normal, reaching a total of 145 percent of the eight-year average on the upper Rio Grande watershed. As a result, the Weather Bureau at Albuquerque had predicted that both the Elephant Butte and Caballo reservoirs would fill completely this year, which is a very unusual occurrence.

Hydraulic Studies

Hydraulic Studies at the St. Anthony Falls Hydraulic Laboratory, Minneapolis, Minn. - The design charts for the SAF Stilling Basin were completed and transmitted to the Regional Office for lithographing.

Mailing of the report entitled "The Hydraulic Design of Rectangular Spillways" was completed on April 21. Many favorable comments have also been received in regard to this report.

Preliminary study was given to a request by the Regional Engineering Division that a model calibration be made of a drop inlet culvert located at the McCredie Missouri Experiment Station. The information obtained from this proposed model study would be used to compute the runoff from the tributary drainage area and to provide a check on the method now used in the Regional Office to design spillways.

The study of transitions for high velocity flows was continued. The transitions tested by Bhoota at the State University of Iowa were analyzed by the method of characteristics presented by Ernst Preiswerk in a work entitled "Application of the Methods of Gas Dynamics to Water Flows with Free Surface" translated in Tech. Memo. #934 and 935 of the National Advisory Committee for Aeronautics. These were compared with Bhoota's experimental results. The statistical comparison is not yet complete but a visual comparison indicated the results to be fairly good -- as good or better than had been expected since some of the assumptions used in developing the method of characteristics are not wholly valid. It will now be necessary to see if transitions designed by the method of characteristics are satisfactory for practical purposes.

*"Snow Surveys and Irrigation Water Forecasts for the Rio Grande Drainage Basin"

Hydraulic Studies in the Outdoor Hydraulic Laboratory, Stillwater, Oklahoma - The work at the laboratory consisted largely in the installation of experimental channels, conveying canals, and wasteways. Channels FC-2 and L-1 were topsoiled and graded to section. On April 8 a number of experimental channels were seeded: (a) FC-1 to a mixture of blue grama, side oats grama and little blue stem, (b) FC-2 to weeping love grass, and (c) unit channels U-5 and U-6 to love grass.

Channel FC-4, serving primarily as a wasteway, was constructed almost entirely with machinery. It will have a bottom roughness and grade irregularities typical of average field channels. It has a trapezoidal section (bottom width 10 ft., side slopes 6:1) with a capacity of 100 cfs. There is a 2.5 percent slope, 300 ft. length of channel available for hydraulic testing. The lining will be unmowed Bermuda grass. The sprigging is almost completed. The final shaping of conveying canals L-5 and L-5E was completed and sprigging with Bermuda grass started.

Hydraulic Studies at Logan, Utah - In connection with the investigations of factors governing soil erosion under irrigation, an automatic recorder was installed to measure the silt content of the eroding stream from experimental flumes and is now in the process of being calibrated.

Permeability and shrinkage measurements were continued. Construction of the canal model was completed and is being used to test the value of various soil materials for lining canals to prevent seepage losses, also to test the influence of construction methods on the performance of these materials as linings.

Hydraulic Studies at McCredie, Missouri - B-2 - A preliminary report was prepared and forwarded to Washington on velocity and retardance of flow for bluegrass during two growth stages and with the grass erect. Study of the data is continuing. Testing of 3-year-old grasses, originally scheduled for this week will be delayed about 2 weeks due to the excessive rains of the last 3 weeks. Information has been assembled concerning farm ponds and wild-life reservoir hydrology for application to the Meramec River Flood Control plan and as a basis for the development of a formal research working plan on the subject.

Hydraulic Studies at the California Institute of Technology, Pasadena, Calif. - Some time was spent in studying over the maps and plans of several spillway structures which were furnished by the Fort Worth office. Consideration is being given to making model tests of these structures.

A first draft of the report on the model tests of the Edwards Creek Spillway was completed. The site of the proposed spillway is near Crockett, California, and the dam is intended to protect the Town of Crockett against floods and sedimentation damage.

Preparations were made to carry out a very short study of "T" dissipators for pipe outlets in cooperation with Region 7. The Region is detaching a man to the Laboratory for a few days to assist in this work. A "T" dissipator consists merely of a short piece of pipe at right angles to the main pipe line, which is intended to dissipate the energy before it is discharged into an erodible channel. One such installation has been built in California and has operated successfully through one season. At the present time several similar installations of considerably higher capacity are being proposed. The objective of the brief test program is to determine if such a structure can be used under the proposed conditions.

The paper by Vito A. Vanoni and James T. Rostron entitled, "A Baffle Type Energy Dissipator for Pipe Outlets" was forwarded to the editor of the Journal of Agricultural Engineering for his consideration for publication.

Some additional tests were made on the pipe flow meter. The objective of these tests was to determine the reliability of the meter calibration under severe outflow conditions under which the velocity distribution is very asymmetric. The preparation of a report on this meter, which is intended for publication, was undertaken. This meter was developed for use in measuring flow from the so-called alfalfa valves which are used locally where irrigation water is distributed in concrete pipe lines. The meter costs about \$25.00, weighs 15 or 20 pounds and can be installed in a relatively few minutes by one man. It has been used by the San Fernando office of the Soil Conservation Service for over six months and has given very satisfactory service.

The Laboratory is continuing to cooperate with the U. S. Navy Drydocks at San Pedro and the California Institute of Technology on a study of harbor improvement which is being carried on on the campus. A good portion of the time of two members of the laboratory staff is absorbed in this work.

Sedimentation Studies

One of a series of papers on sedimentation studies in the Middle Rio Grande Valley, New Mexico, was published in the April 1944 issue of the Journal of Sedimentary Petrology. The abstract of this paper entitled "Significance of Texture and Density of Alluvial Deposits in the Middle Rio Grande Valley" by Stafford C. Happ is as follows:

"Mechanical analyses of representative samples indicate that alluvial deposits accumulated in the Middle Rio Grande Valley, during the period 1936-41, had an average composition of approximately 43% sand, 41% silt, and 16% clay according to the Wentworth size grades. The median grain size was about 0.054 mm., which is in the coarsest silt size of the Wentworth classification or in the very fine sand size of the soils classification of the Department of Agriculture. Corresponding determinations of the sediment density (dry weight per

unit volume) indicate an average density of about 86 pounds per cubic foot for the median grain size of all the deposits, about 85 pounds per cubic foot for the overbank flood-plain deposits, and 100 pounds per cubic foot for the river-bed sediment. The results lend support to the use of sand sizes as criteria of the sources of all sediment in the Valley. The textural data also indicate that sand accumulation along the Rio Grande is due to excessive supply from tributary sources rather than lag accumulation; that channel avulsions and "splay" deposits of sand on the flood plain are major factors in the river regime; and that extension of the textural studies might provide a useful measure of the relative importance of different erosional processes. In combination with other available data, the density determinations provide a basis for estimating the entire rate of sediment output, or net erosion, from the drainage basin above Elephant Butte Reservoir, which is at the lower end of the Middle Valley. This rate is indicated as 0.7 acre-foot per square mile for the period 1936-41, equivalent to an average rate of surface lowering of 1 inch in about 75 years. Other studies indicate that this 5-year rate is probably somewhat lower than the average for a period of 15 to 25 years."

Another paper entitled "Errors of Sampling Sands for Mechanical Analysis" by Gordon Rittenhouse and Mark P. Connaughton appears in the same journal issue. In abstract:

"The errors involved in determining the median grain size, the Trask sorting coefficient, and the percentages of sediment in individual size grades are presented for fluvial sands and for heavy minerals in such sands. The relation between sampling errors for heavy minerals and for entire samples is discussed."

Additional sediment load data for streams in the Rio Grande drainage basin have been received from the U. S. Army Engineers, and are being incorporated in the analysis of sediment production in the Southwestern States.

Additional information has been obtained on costs of dredging and effects of sedimentation in Baltimore Harbor, necessitating some revision of a paper on effects of sedimentation on navigation in the Chesapeake Bay region.

Sediment Studies at the California Institute of Technology, Pasadena, California - The flow measuring devices on the revised 10 1/2-inch flume circuit were calibrated against a venturimeter which was placed in the circuit temporarily. The flume has not been calibrated with sediment in the circuit.

Preparations for the density current study at Shaver Lake were in progress during the month. Additional velocity measuring apparatus was received and made ready for field use. Good use was made of temperature data on Shaver Lake furnished by the Southern California Edison Company. These data were used in planning the experimental program.

Copies of reports by Jack Janofsky of the Fruit-Frost Service, Pomona, California, were received from the author during the month. In one of these, which deals with atmospheric density currents, several references are made, or direct quotations are taken from papers on density currents by Robert T. Knapp and Hugh Stevens Bell. So far as we know, this is the first use meteorologists have made of the material we have published.

The Laboratory was visited by Mr. Santa Maria, a Chilean hydro-electric engineer who was touring the United States under the auspices of the U. S. State Department and the Government of Chile.

The Laboratory was also visited by Messrs. Tom C. Mead and Larsen of the U. S. Bureau of Reclamation. The main subject of conversation with these people was the movement of sediment in relation to proposed reservoirs on the Little Colorado River. Mr. Larsen is in charge of the investigations at the Coconino dam site on the Little Colorado River below Cameron, Arizona. The Laboratory was visited by Mr. L. E. Peterson and Mr. F. L. Monroe of the Southern Pacific Railway Company. These men are in charge of Drainage and Flood Control work for the Railway Company and came to the Laboratory to get information on drop structures for use in erosion control. They were shown through the Laboratory and also shown the motion picture on drop structures. They were very glad to get the design information on drop structures and expected to put it to good use. These gentlemen stated that during the last year their company spent over \$800,000 for erosion control on their right-of-way in the San Bernardino district. It is gratifying to note that the work of the Soil Conservation Service and of the Laboratory can be applied in the protection of railroads.

IRRIGATION DIVISION

Flow of Water in Canals and Pipes

Water-supply Improvement (Texas) - Upon request of SCS Region 4, a senior irrigation engineer of the Division of Irrigation was made available to advise in a study relative to the improvement of quality and quantity of water for the seven organized water-control districts on the Pecos River of Texas, which are within one of the soil conservation districts under Region 4, and which now divert water from the river along a reach of some 60 miles, with each lower diversion receiving water with higher salt concentration than those above. All of these districts are under contract to receive water from the Red Bluff Reservoir located on the State line between New Mexico and Texas. The only way by which water of the same quality could be delivered to these districts would be by means of a common diversion and a grand canal serving most of the districts and delivering water to each participating district as the canal passes near the upper end of each present district canal. Our engineer was delegated to make a study of the possibilities of such a concrete-lined canal, and following a field trip with various interested officials, prepared a verbal report which was accepted at a conference of Government, State, and local officials. Following this action a complete "paper preliminary" of the accepted proposals was submitted to the Region 4 representatives. It was agreed by the chief officers of the various interested divisions that they would go ahead with a preliminary instrument survey upon which to base a closer estimate of cost of a grand canal and necessary structures. Our engineer also prepared a list of desirable items to include in the survey and suggested the necessary minimum field party to accomplish these things. The present proposal is to make this survey shortly after the first of the new fiscal year and then again request our engineer to return to Texas and make a more detailed study for the Grand Canal.

Lining of Irrigation Canals and Ditches (Utah)

The technical manuscript reporting canal-lining experiments in the Delta Area, Utah, after being reviewed by the Berkeley office and the U. S. Regional Salinity Laboratory at Riverside, Calif., was being copied in the office of the Director of the Utah Agricultural Experiment Station, for sending out to printers for bids. The project leader made a series of measurements of permeability in the Delta, Melville Companies' C-Canal, using the variable-head permeameter. It was found that the permeability of the clay is still less than one-half foot per year. Water-table depths were also measured on 3 lines at right angles to the C-Canal lined section. Consideration was also given to proposed drainage and canal-lining studies in Salt Lake County, Utah.

Control of Silting in Irrigation and Drainage Systems

Texas - Stencils were cut for making mimeographed copies of a report on "The Silt Load of Texas Streams - Part V. (A progress report as of October 1, 1942 to September 30, 1943)." These yearly progress reports have been prepared since 1939 and demand for this information is increasing as new developments of Texas streams are being planned for a postwar period. Approximately 150 requests have been made for similar reports from Texas and surrounding States. Two collectors of silt samples were instructed to obtain extra daily samples and allow the silt to settle so that a sufficient quantity of the material could be available for soil tests such as porosity, classification of soil grains, density, volume weight determination, weight per cubic foot of wet and dry silt, etc. Eventually these silt analyses will be available for all of the watersheds.

Design, Invention and Testing of Irrigation and Drainage Apparatus

Sand Traps - A brief report was being prepared covering the subject of Sand Traps, which discusses the various types of these devices investigated in the laboratory by means of model studies - the vortex tube, deflector vanes, riffle deflectors and (probably the most practical) the combination riffle-deflector-vortex-tube trap.

Storage of Water Underground for Irrigation

Santa Ana River, Calif. - Recorded measurement of the water diverted to the Santa Ana River spreading grounds was continued. The daily amount of water spread during the 1943-44 season was worked up to date in accordance with an informal agreement with the San Bernardino Valley Water Conservation District. The season had not been good from the viewpoint of surface runoff available for replenishment of the underground supply. By Court stipulation the District is limited to 9,000 acre-feet of water annually for spreading purposes but only 60 percent of this had been available.

San Joaquin Valley, Calif. - Active work was started on the co-operative water-spreading project in San Joaquin Valley. The Division of Irrigation is participating both in laboratory and field tests designed to determine the infiltration rates and also to find means by which the rate might be increased, or at least to prevent the usual decrease in the original rate. Assistance was given the Regional Salinity Laboratory at Riverside in percolation studies from sample cores. Core samples from the San Joaquin Valley are being tested for permeability. Twenty-five cores are being used, some having different soils and others having nearly the same soils being given different treatments for increased rate of flow through the soil.

Drainage of Irrigated Land

Imperial Valley, Calif. - An additional field determination of soil permeability was completed, with field and laboratory rates agreeing closely. The field permeability coefficient was about 6.1 cubic centimeters per centimeter per hour while the laboratory measurement was about 5.3. With a total permeability range in aquifer materials investigated of 500 cc/cm/hr down to .005, this is very close agreement. Investigation of materials for filtering fine sand out of the water coming into drainage sumps was begun. Sump conditions are duplicated as nearly as possible in the work shop.

Water-Application Efficiencies in Irrigation (Utah)

A final report closing this project was sent to the Director of the Utah Agricultural Experiment Station, approved by him and transmitted to the Office of Experiment Stations at Washington, D. C. It is understood that if, after victory, there seems to be a demand for further water-application efficiency studies, a new project outline will be prepared.

Evaporation Losses Affecting Irrigation Practices

Evaporation from Water Surfaces (Calif.) - Review and revision of the Fullerton, Calif. report was continued and a part of it was ready for stenciling.

Texas evaporation study - Since the evaporation station was established at Buchanan Dam in cooperation with the Lower Colorado River Authority in September, 1943, the coefficient between the Bureau of Plant Industry pan (sunken pan 60 ins. diameter by 24 ins. deep) and Division of Irrigation sunken screen pan (24 ins. diameter by 36 ins. deep) is 1.01 while the coefficient between the B.P.I. and Weather Bureau pan (surface pan 48 ins. diameter by 10 ins. deep) is .77. Much interest is being manifested by engineers and others in these investigations and the Lower Colorado River Authority is planning to establish another station at their Marshall Ford Dam as soon as instruments and pans can be secured.

Evapo-Transpiration and Seepage Losses Affecting Irrigation Practices

Santa Ana Canyon Water Supply Study (Orange and Riverside Counties, California) - After receiving written authority from land owners, seven ground-water observation wells were driven to depths ranging from 20 to 60 feet in the Santa Ana River Valley below Prado Dam, in cooperation with the U. S. Geological Survey. A gasoline-driven hammer was used and special driving equipment was designed for the work. The wells were so located that the ground-water-table slope and

permeability of the valley fill can be determined during periods of heavy pumping. From these data, the rate of underflow leaving the study area during the irrigation season will be calculated. An evaporation pan was installed temporarily at the Prado Dam station to check the existing Orange County Flood Control District pan. Five years of record are available from the Flood Control District pan but it was considered advisable to check the accuracy before accepting them. Records were started on the use of water by native vegetation growing in a tank, which will provide an index of the water lost through evapo-transpiration from valley lands.

Carlsbad, New Mexico - The compilation of weekly evaporation, evapo-transpiration, temperature, humidity, precipitation and wind movement records at the Carlsbad station was continued. On April 1 the evaporation and evapo-transpiration stations at Carlsbad were dismantled.

Irrigation Practices as They Affect Water Supplies

Fort Stockton, Texas - The field work at Fort Stockton, Texas, in cooperation with Pecos County Water Improvement District No. 1 was temporarily discontinued on account of lack of personnel and sufficient funds. It is hoped to continue with this important work in the near future. In the meanwhile, data obtained from 63 different farm units of the Fort Stockton District are being compiled for use in a duty of water report for West Texas conditions.

San Joaquin Valley, Calif. - A study of water needs of principal crops grown in San Joaquin Valley, Calif., undertaken at the invitation of the Bureau of Agricultural Economics on behalf of the War Department, seeks to ascertain the prevailing irrigation practices in that Valley with respect to amounts of water supplied to the principal crops. The recommended units will be applied to land-use determinations in arriving at estimates of the total water needs of the completely developed project involving the entire Valley.

Seepage Losses Affecting Irrigation Practices

Computation of seepage losses from pools was completed and an outline for the report on the seepage investigations was prepared. At the request of the State Engineer of Colorado, a statement was prepared regarding the method of computing losses from reservoirs from U. S. Weather Bureau evaporation records and precipitation data.

Pumping for Irrigation

A report on Operation and Maintenance of Irrigation Pumping Plants, which was prepared some time ago, was accepted for publication in "Through the Leaves," a magazine published by the Great Western Sugar Company and sent to all farmers who grow sugar beets. Since many of these farmers have pumping plants, it is believed the material in this article will be brought to the attention of many who are interested in the subject.

Snow Surveys and Irrigation Water Supply Forecasts

Western Montana, Western Wyoming, Northern Nevada, Idaho, and Washington - Report of April 1 snow surveys (issued April 10) indicated that there would be a very low runoff this year. However, the large carry-over water in reservoirs from last season alleviates the situation somewhat as far as irrigation requirements are concerned. It was estimated that approximately 900,000 acres out of the 3,828,000 acres of irrigated land in Columbia Basin would be short of water during mid-summer and late season. Water users without storage rights were shown to face critical water shortage. The situation was relieved by copious April rainfall, though the outlook is still for serious water shortage.

Oregon - Water Forecast Committee meetings were held in The Dalles, Pendleton, Union, Ontario, Canyon City, Prineville, Lakeview and Medford, and Associated Press dispatches were issued each day covering local water-supply outlook. The final report of Snow Surveys and Irrigation Water Forecasts for Oregon, issued April 8, covering the 1944 water supply prospect indicated 70 percent of irrigated lands have in sight good to fair water supplies. These are lands chiefly served from reservoirs containing substantial hold-over from 1943. Very few areas depending for irrigation upon unregulated stream flow have in sight other than deficient to fair water supplies. Prospective 1944 water supply to Oregon's total irrigated acreage is expected to be good for 48 percent, fair for 22 percent and deficient for 25 percent. Five percent of the irrigated acreage is not covered by our forecast service. The Seventh Annual Columbia River Basin Interstate Water Forecast Committee meeting was held in Portland on April 18. Below-average stream flows were predicted for Columbia River and all of its tributaries. The discharge of the main river at the Dalles, Oregon, was expected to be 38 percent below average.

Colorado, Eastern Wyoming, Eastern Montana, South Dakota, Arizona, New Mexico - The April 1 water-supply forecast reports were issued covering the Missouri-Arkansas, Colorado River and Rio Grande drainage basins. During the last half of March the outlook for an ample runoff for the 1944 season had improved and the snow surveys over practically all the areas reporting indicated a substantial increase in the water content over that of March 1, especially for the Rio Grande drainage. The month of April, from the standpoint of precipitation, was above normal, particularly on the east slopes of the Continental Divide. The snow cover in the San Luis Valley was exceptionally heavy and also at various places in Wyoming.

Rehabilitation of Irrigation and Drainage Enterprises

Runkle Canyon, Ventura County, Calif. - Coincident with the study made in March, to determine the appraisal of benefits expected to accrue to certain lands tributary to Gabbert Canyon in Ventura County, from contemplated erosion control, field work was conducted looking to

the ascertainment of damages caused by the floods of Runkle Canyon descending upon highly developed agricultural lands near Santa Susana. Following completion of the field work, a report was prepared.

Customs, Regulations & Laws Affecting Farm Irrigation and Drainage

Central Valley Project, Calif. - After reviewing suggestions from other members of Study Group 6 (Cost and Value Relation of Irrigation Services) on Problem 16 (Water Prices), the report of the study group was completed and sent to the other members for their final approval. Committee 12 (Payments from Indirect Beneficiaries) met and adopted a revised draft of the committee report. This was then circulated among the members for their signatures. It is anticipated that there will be no further meetings of this committee.

5/26/44